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Roberts
Appeal
Brief
1083

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:) Group Art Unit: 2833
Kaori YASUFUKU et al.) Examiner: Felix O. FIGUEROA
Serial No. 09/643,948) Confirmation No.: 9826
Filed: August 23, 2000)
For: CONNECTOR FOR A MODULE)
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)
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APPEAL BRIEF

Honorable Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In accordance with the provisions of 35 U.S.C. §134 and 37 C.F.R. §1.192(a), Appellant submits this *Appeal Brief* in triplicate to appeal the Examiner's final rejection of claims 1-20 in the *Office Action* dated March 31, 2003.

A check covering the \$320.00 requisite Government fee is also being filed herewith. The Commissioner is authorized to charge any fees that may be required by this paper, and to credit any overpayment, to Deposit Account No. 19-2380 (740819-000698).

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I. REAL PARTIES IN INTEREST

The named inventors, namely Kaori Yasufuku, 202, 9-1, Kikuna 7-chome, Kohoku-ku, Yokohama-shi, Kanagawa, Japan, Taiji Hosaka, 802, 5-8, Tsunashimanishi 2-chome, Kohoku-ku, Yokohama-shi, Kanagawa, Japan, and Masaaki Miyazawa, 202, 12-3, Chitoseshinmachi, Takatu-ku, Kawasaki-shi, Kanagawa, Japan, have assigned all ownership rights in the pending application to J.S.T. Mfg. Co., Ltd. of 4-8, Minamisenba 2-chome, Chuo-ku, Osaka-shi, Osaka 542-0081, Japan. Accordingly, J.S.T. Mfg. Co., Ltd. is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

The Appellants, their legal representatives, and the assignee are not aware of any other pending appeals or interferences which will directly affect or be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-20 are pending in the present application, of which claims 1 and 20 are independent. No claims have been deemed allowable over the prior art of record by the Examiner. All pending claims are on appeal.

Claims 1-4, 9, 14, and 15 stand rejected under 35 U.S.C. §103(a) as unpatentable over Tondreault (U.S. Patent No. 5,769,668) in view of Geib (U.S. Patent No. 4,761,140). Further, claims 5, 6, 10, 11, 16, 17, and 20 stand rejected under 35 U.S.C. §103(a) as unpatentable over Tondreault and Geib, and further in view of Loo et al. (U.S. Patent No. 5,648,890 – hereafter Loo). Finally, claims 7, 8, 12, 13, 18, and 19 stand rejected under 35 U.S.C.

§103(a) as unpatentable over Tondreault and Geib, and further in view of Cronin et al. (U.S. Patent No. 6,246,583 – hereafter Cronin). This appeal is directed to the above-mentioned rejections, and the status of the claims in this application is as set forth above in Appendix A.

IV. STATUS OF THE AMENDMENTS

All amendments previously submitted in connection with the present application are believed to have been entered and fully considered by the Examiner. The most recent response filed by Appellant is the Request for Reconsideration filed January 21, 2003, which per the Office Action dated March 31, 2003 has been fully considered by the Examiner and found not to overcome the rejections.

V. SUMMARY OF THE INVENTION

The present invention is directed to a connector for connecting a module to a printed circuit board. The module has a semiconductor chip mounted on a rectangular board and includes conductive pads on a front side of the board. The connector includes a u-shaped connector body having a receiving part that extends along the front side of the module when the module is in a connection position, and a lateral supporting part that extends rearward from the receiving part to support a left side, a right side, and a bottom of the module in the connection position. The receiving part on the front side of the connector has a groove that is provided with contacts for receiving the conductive pads of the module. The connector further includes a metallic cover pivotably connected to the connector body and movable to a position that sandwiches the module between the metallic cover and the supporting part to thereby maintain the module in the connection position.

As disclosed in the paragraph bridging pages 4 and 5 of the specification, when the module is to be inserted into the connector, first, the module is set in the insertion/withdrawal position and the front side of the module is put into the groove of the receiving part, as shown in, e.g., Figs. 3A and 3B; thus, the front side is inserted to the contact. Next, the metallic cover is put over the module and the metallic cover is pressed down. As a result, the rear side of the module will be pressed down and the conductive pad will come into contact with the contact, as shown in, e.g., Figs. 4A and 4B. Further, when the metallic cover is put over the connector body and engaged to it, the module will be sandwiched between the supporting part and the metallic cover and kept in the connection position.

In one of the disclosed embodiments in the specification, the metallic cover includes a heat sink that helps to dissipate heat from the module.

As disclosed in the second paragraph of page 5 and the first paragraph of page 6 of the specification, an advantage of the present invention is that, even if the connector is subjected to thermal load from the semiconductor chip, as the connector body is reinforced by the metallic cover, and as the thermal load to the connector body is reduced by the heat-dissipating effect of the metallic cover, the connector body will not be deformed.

Furthermore, as the retaining structure of the connector is designed to sandwich the module between the metallic cover and the supporting part, even if the connector is subjected to thermal loads, the retaining force for the module will not be affected. Thus, the connector can retain the module reliably.

Moreover, as the connector body has no parts that are subjected to elastic deformation by manipulation, such as that of the prior art discussed in first paragraph of page 1 through first paragraph of page 3 of the specification, the connector body will not be damaged. Thus

the module can be retained in the connection position reliably. Accordingly, even if the heat generation of semiconductor chip of the module increases significantly, defective connection and disconnection of the module can be prevented.

Further, as the metallic cover covers the connector body and the module, the cover exhibits its shielding function to reduce the effects of electromagnetic waves or the like on the connector for module and the module. Thus the stable operation of the circuit can be maintained.

V. STATEMENT OF ISSUES

- A. Whether claims 1-4, 9, 14, and 15 are *prima facie* obvious in view of the combination of Tondreault and Geib.
- B. Whether objective evidence of non-obviousness has been set forth to establish the patentability of claims 1-4, 9, 14, and 15 over the combination of Tondreault and Geib.
- C. Whether claims 5, 6, 10, 11, 16, 17, and 20 are *prima facie* obvious in view of the combination of Tondreault and Geib, and further in view of Loo.
- D. Whether objective evidence of non-obviousness has been set forth to establish the patentability of claims 5, 6, 10, 11, 16, 17, and 20 over the combination of Tondreault and Geib, and further in view of Loo.
- E. Whether claims 7, 8, 12, 13, 18, and 19 are *prima facie* obvious in view of the combination of Tondreault and Geib, and Cronin.

- F. Whether objective evidence of non-obviousness has been set forth to establish the patentability of claims 7, 8, 12, 13, 18, and 19 over the combination of Tondreault and Geib, and Cronin.

VI. GROUPING OF THE CLAIMS

Appellants respectfully submit that the rejected claims 1-20 stand or fall together.

VII. ARGUMENTS

- A. 1-4, 9, 14, and 15 are not *prima facie* obvious in view of the combination of Tondreault and Geib.

To establish a *prima facie* case of obviousness, three criteria must be met. *M.P.E.P.* §2143. First, there must be some teaching, suggestion, or motivation to combine or modify the teachings of the prior art to produce the claimed invention, found either in the references themselves or in the knowledge generally available to a skilled artisan. *In re Fine*, 837 F.2d 1071, 5 USPQ.2d 1596 (Fed. Cir. 1988). Second, there must be a reasonable expectation of success. *In re Rhinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976). Third, the prior art must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

The Appellants respectfully contend that the findings of the Office Action fail to support a *prima facie* case of obviousness since it fails to provide suggestion or motivation to modify the Tondreault reference with the Geib reference.

The Tondreault Reference

Tondreault discloses a connector body (10) having a receiving part (14), a supporting part (24, 26) and a positioning mechanism (28, 30). Tondreault also discloses locking members 34 having a ramped shaped locking head 36 such that the locking heads overlap the side edges of the module 12 in order to maintain the module 12 in the locked position, as disclosed in, e.g., col. 5, lines 47-50. As acknowledged by the Examiner, however, Tondreault fails to disclose, teach, or suggest a metallic cover or a metallic cover having a heat sink. Consequently, Geib is cited in order to modify Tondreault.

The Examiner contends that Geib discloses “a hinged, removable metallic cover (14) including first connection means (102) and second connection means (98), to keep a module in place”, and that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a cover, as taught by Geib, to help keep the module from moving from the connecting position.

The Geib Reference

Geib discloses a minimum insertion force self-cleaning and anti-overstress Plastic Leaded Chip Carrier (PLCC) receiving socket. The receiving socket includes a socket body 12 having rectanguloid walls and contacts 42 and 44 on a periphery inside the rectanguloid walls. The receiving socket is for receiving a four-sided chip with each side having conductive pads, which make electrical contact with the contacts 42 and 44, on the periphery of its underside. The Examiner contended that Geib discloses “a hinged, removable metallic

cover (14) including first connection means (102) and second connection means (98), to keep a module in place". However, more specifically, Geib discloses element 98 as a latch arm that works with shoulder portions 104 to secure cover 14 to a socket body 12, and elements 102 as arms that hingely connects cover 14 to post 112 on the socket body 12.

Appellants respectfully submit that there is no motivation or suggestion provided by Tondreault or Geib to combine a module connector, which has no lid or cover, of Tondreault with the cover of the PLCC receiving socket of Geib.

As mentioned above, Tondreault includes locking members 34 having a ramped shaped locking head 36 such that the locking heads overlap the side edges of the module 12 in order to maintain the module 12 in the locked position. The presently claimed invention, on the other hand, includes no such locking mechanism and utilizes the cover in order to lock the module in place with respect to the connector body 210.

As Tondreault already includes a locking mechanism to secure a module to a connector, there is no reason or motivation, except that set forth by Appellants' specification and claimed invention, for one of ordinary skill in the art to resort to the teachings of Geib in order to place a cover in connection with the connector body of Tondreault as suggested by the Examiner.

In other words, there is no teaching in Tondreault and Geib of how to combine the locking members 34 of Tondreault with the latch arms 98 on the cover 14 of Geib. The combination of these references without modification would result in a connector having two (2) locking mechanisms.

The Examiner responded to the arguments by asserting that it would be obvious to combine the cover of Geib with the electrical connector of Tondreault, even though

Tondreault already has a locking mechanism, so as to provide “redundancy” for the locking mechanism of Tondreault. This assertion relating to “redundancy” as a suggestion or motivation was discussed during the interview and is summarized in the Interview Summary of January 8, 2003 and in the final Office Action of March 31, 2003.

Appellants respectfully submit that, although redundancy may be a desirable feature to have in locking mechanisms, microprocessors, life-support systems, and etc., there is no desire or need for a redundant locking means in Appellants’ claimed connector, or the connectors of Tondreault or Geib. In other words, neither the presently claimed invention nor the cited prior art references teaches or suggests a necessity for a redundant locking mechanism such that one would add the cover of Geib to the connector of Tondreault so as to provide a redundant means to secure a module to a connector in addition to the existing locking mechanism of Tondreault.

Further, in order to incorporate the cover of Geib as a redundant locking mechanism in addition to the existing locking mechanism of Tondreault, one would have to take into consideration the technical and economic factors. For example, adding a redundant feature would undesirably increase complexity, cost, size, and weight, for example, of a connector. Hence, without suggestion or motivation in any of the cited prior art references for redundancy, the Examiner’s reasoning is completely insupportable.

Still further, in order to combine the hinged cover of Geib with connector of Tondreault to arrive at the presently claimed invention, at least some physical modification would be necessary. For example, an issue would be the modification of the resilient springs

94 in the cover 90 of Geib such that the cover would be usable in the connector of Tondreault or the presently claimed invention.

Appellants respectfully submit that none of the cited prior art teaches, discloses, or suggests how to modify their teachings so that they can be combined and functional, and that Tondreault and Geib do not disclose, teach, or suggest a double locking mechanism or a need for redundancy for a locking mechanism.

B. The requisite motivation for applying the teachings of Tondreault and Geib does not exist to support a *prima facie* case of obviousness as proposed by the Examiner in rejected claims 1-4, 9, 14, and 15.

Claims 1-4, 9, 14, and 15 have been rejected under 35 U.S.C. §103(a) as unpatentable over Tondreault and Geib. This rejection is respectfully traversed and reversal of the Examiner's position with respect thereto is earnestly solicited in that the objective evidence of obviousness has not been set forth by the Examiner.

As mentioned above, Tondreault completely fails to teach, disclose or suggest a metallic cover, and, although Geib discloses a metallic cover, there is no suggestion or motivation to combine the cover of the PLCC receiving socket that is structurally and functionally different from the presently claimed metallic cover.

Further, as discussed above, the Examiner asserted that the invention of Tondreault and Geib are combinable, even when the connector of Tondreault combined with the cover of Geib would result in a connector having two locking mechanisms for secure a module to the connector, and that having two locking mechanisms is desirable for redundancy purpose. However, Appellants respectfully submit that there is no suggestion or motivation in the

presently claimed invention or in the Tondreault and Geib references for a redundant locking mechanism, and there is no suggestion or motivation for modifying the connector of Tondreault and the cover of Geib so that the presently claimed invention may be made. Essentially, the Examiner has ignored any technical and economic factors of having a simple and elegant connector design without adding a redundant locking mechanism to secure a module to a connector. Therefore, a *prima facie* case of obviousness has not been established, and independent claim 1, as well as dependent claims 2-4, 9, 14, and 15 of the present invention, are distinguishable over Tondreault and Geib.

Accordingly, for at least the reasons set forth above with respect to independent claim 1, as well as claims 2-4, 9, 14, and 15, Appellants respectfully contend that the Patent Office has failed to carry its burden of establishing a *prima facie* case of obviousness. The reversal of the Examiner's position, as well as allowance of claims 1-4, 9, 14, and 15 in view of the foregoing arguments, is respectfully requested.

C. Claims 5, 6, 10, 11, 16, 17, and 20 are not *prima facie* obvious in view of the combination of Tondreault, Geib, and Loo.

The Appellants respectfully contend that that the findings of the Office Action fail to support a *prima facie* case of obviousness since it fails to provide suggestion or motivation to modify the Tondreault reference and the Geib reference with the Loo reference.

The Loo Reference

With respect to Loo, the reference clearly lacks several features set forth in the metallic cover defined in the claimed invention. For instance, while the Examiner describes Loo as disclosing "a cover (16) having...a heat sink (20)," there is no such disclosure

throughout the entire Loo patent. As disclosed in Loo, the "cover" (16) is actually an alignment plate that is made of a polymer material and is fabricated with a number of alignment pins 40, a plurality of housing cavities 38 and a plurality of join cavities 36, and the heat sink (20) is secured to a base plate 18 and substrate 14 by nuts and bolts inserted through cavities 36 on the alignment plate. Therefore, Loo is deficient for failing to disclose at least a metallic cover, such as claimed at least in claim 20 of the present invention.

Further, Loo is deficient in, among other claimed features, a connector body having a receiving part that extends along a front side of a module being in a connection position, and a groove provided on a rear face thereof into which the front side of the module is inserted, and a pair of support parts that extend from the receiving part to support a left side, a right side and a bottom of the module in the connection position, as recited in independent claims 1 and 20.

D. The requisite motivation for applying the teachings of Tondreault, Geib, and Loo does not exist to support a prima facie case of obviousness as proposed by the Examiner in rejected claims 5, 6, 10, 11, 16, 17, and 20.

As Tondreault and Geib are deficient, as set forth in the traversal of the rejection of independent claim 1 and dependent claims 2-4, 9, 14, and 15, and as Loo is deficient in a metallic cover and lacks motivation or suggestion to combine the alignment plate 16 and the heat sink 20 with Tondreault and Geib, the §103(a) rejection of claims 5, 6, 10, 11, 16, 17, and 20 is improper.

Accordingly, for at least the reasons set forth above with respect to independent claims 1 and 20, as well as dependent claims 5, 6, 10, 11, 16, 17, the Appellants respectfully

contend that the Patent Office has failed to carry its burden of establishing a *prima facie* case of obviousness, and reversal of the Examiner's position as well as allowance of claim , 6, 10, 11, 16, 17, and 20 in view of the foregoing arguments is respectfully requested.

E. Dependent claims 7, 8, 12, 13, 18, and 19 are not *prima facie* obvious in view of the combination of Tondreault, Geib, and Cronin.

The Appellants respectfully contend that that the findings of the Office Action fail to support a *prima facie* case of obviousness since it fails to provide suggestion or motivation to modify the Tondreault reference with the Geib reference.

Cronin is applied as a secondary reference in the rejection of dependent claims 7, 8, 12, 13, 18, and 19 and as teaching a cover including a contact part to transfer the thermal energy to a heat sink (211). However, Cronin discloses a method and apparatus for removing heat from a semiconductor device mounted on a carrier package. As shown in Fig. 2 and in column 3, lines 53-60, for example, cover 207 is coupled to a semiconductor device 203 via a thermal conductive grease layer 209. Further, cover 207 is bonded to a substrate 205 and heat sink 211 using epoxy, as disclosed in col. 5, lines 48-55.

Clearly, Cronin does not disclose a metallic cover pivotally connected to a connector body, as well as a connector body. Moreover, cover 207 of Cronin is permanently fixed to substrate 205 and, hence, permanently encases semiconductor device 203. Appellants respectfully assert that, although Cronin does disclose a heat sink, there is no motivation or suggestion to combine the heat sink of Cronin with a connector of Tondreault or to a cover of a PLLC receiving socket of Geib.

F. The requisite motivation for applying the teachings of Tondreault, Geib, and Cronin does not exist to support a *prima facie* case of obviousness as proposed by the Examiner in rejected claims 7, 8, 12, 13, 18, and 19.

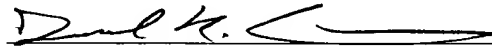
As Tondreault and Geib are deficient, as submitted above with respect to the rejection of independent claims 1 and 20, Tondreault and Geib are not combinable with Cronin. Moreover, Cronin is deficient of motivation or suggestion for combining its heat sink with the connector of Tondreault and the cover of Geib, therefore, the combination of Cronin with Tondreault and Geib is further improper.

Accordingly, for at least the reasons set forth above with respect to independent claims 1 and 20, as well as dependent claims 7, 8, 12, 13, 18, and 19, Appellants respectfully contend that the Patent Office has failed to carry its burden of establishing a *prima facie* case of obviousness, and reversal of the Examiner's position as well as allowance of claim 7, 8, 12, 13, 18, and 19 in view of the foregoing arguments is respectfully requested.

VIII. CONCLUSION

For the foregoing reasons it is respectfully asserted that pending claims 1-20 of the present application are allowable over the applied prior art references. Appellants respectfully request that the outstanding rejections of record of the claims be reversed, that such pending claims be allowed and that the present application be passed to issue.

Respectfully submitted,



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APPENDIX A

PENDING CLAIMS

1. (Four Times Amended) A connector for a module having a semiconductor chip mounted on a rectangular board and a conductive pad on the front side of the board, the connector connecting the module to a printed circuit board in a position wherein a plane of the board is substantially parallel to the printed circuit board, said connector comprising:

a connector body having a receiving part that extends along the front side of the module being in the connection position, and a groove provided in a rear face thereof into which the front side of the module is inserted, said groove having contacts provided therein which contact the conductive pad on both a top surface and a bottom surface of the module when the module is placed in an insertion/withdrawal position while allowing the pad to shift in a direction of insertion/withdrawal when the module is in the insertion/withdrawal position in which the rear side of the module is at a higher level than in the connection position, and a pair of lateral supporting parts that extend from the receiving part to support a left side, a right side and a bottom of the module in the connection position; and

a metallic cover including a first connection means for pivotably connecting said metallic cover to said receiving part of said connector body and a second connection means for connection to said lateral supporting parts, said metallic cover adapted to engage the connector body to sandwich the module between said metallic cover and the supporting part to thereby maintain the module in the connection position,

wherein said lateral supporting parts each include a stepped part formed on an inner side thereof for supporting the side and bottom faces of the module, and a slotted portion

formed on an outer side thereof for receiving said second connection means of said metallic cover.

2. (Original) A connector for module according to claim 1 wherein said metallic cover is hinged at the front to the receiving part and the rear end of the metallic cover can be lifted.

3. (Original) A connector for module according to claim 2 wherein said metallic cover is removably provided to the connector body.

4. (Twice Amended) A connector for module according to claim 2 wherein at least one of said connector body and said metallic cover is provided with a positioning mechanism that positions the module in a front-rear direction when the module is set into the connection position.

5. (Amended) A connector for module according to claim 4 wherein a window is provided in said metallic cover to expose the semiconductor chip of the module being in the connection position, and in this window a heat sink that will contact said semiconductor chip is connected to the metallic cover.

6. (Amended) A connector for module according to claim 5 wherein at least one of said metallic cover and said heat sink covers said contacts and the conductive pad to exhibit a shielding function against electromagnetic waves.

7. (Original) A connector for module according to claim 4 wherein said metallic cover is provided with a contacting part that contacts the semiconductor chip of the module being in the connection position, and the contacting part is provided with a heat sink.

8. (Amended) A connector for module according to claim 7 wherein at least one of said metallic cover and said heat sink covers said contacts and the conductive pad to exhibit a shielding function against electromagnetic waves.

9. (Twice Amended) A connector for module according to claim 3 wherein at least one of said connector body and said metallic cover is provided with a positioning mechanism that position the module in a front-rear direction when the module is set into the connection position.

10. (Amended) A connector for module according to claim 9 wherein a window is provided in said metallic cover to expose the semiconductor chip of the module being in the connection position, and in this window a heat sink that will contact said semiconductor chip is connected to the metallic cover.

11. (Amended) A connector for module according to claim 10 wherein at least one of said metallic cover and said heat sink covers said contacts and the conductive pad to exhibit a shielding function against electromagnetic waves.

12. (Original) A connector for module according to claim 9 wherein said metallic cover is provided with a contacting part that contacts the semiconductor chip of the module being in the connection position, and the contacting part is provided with a heat sink.

13. (Amended) A connector for module according to claim 12 wherein at least one of said metallic cover and said heat sink covers said contacts and the conductive pad to exhibit a shielding function against electromagnetic waves.

14. (Original) A connector for module according to claim 1 wherein said metallic cover is removably provided to the connector body.

15. (Twice Amended) A connector for module according to claim 14 wherein at least one of said connector body and said metallic cover is provided with a positioning mechanism that positions the module in the front-rear direction when the module is set into the connection position.

16. (Amended) A connector for module according to claim 15 wherein a window is provided in said metallic cover to expose the semiconductor chip of the module being in the connection position, and in this window a heat sink that will contact said semiconductor chip is connected to the metallic cover.

17. (Amended) A connector for module according to claim 16 wherein

at least one of said metallic cover and said heat sink covers said contacts and the conductive pad to exhibit a shielding function against electromagnetic waves.

18. (Original) A connector for module according to claim 15 wherein said metallic cover is provided with a contacting part that contacts semiconductor chip of the module being in the connection position, and the contacting part is provided with a heat sink.

19. (Amended) A connector for module according to claim 18 wherein at least one of said metallic cover and said heat sink covers said contacts and the conductive pad to exhibit a shielding function against electromagnetic waves.

20. (Three Times Amended) A connector for a module having a semiconductor chip mounted on a rectangular board and a conductive pad on a front side of the board, the connector connecting the module to a printed circuit board in a position wherein a plane of the board is substantially parallel to the printed circuit board, said connector comprising:

a connector body having a receiving part that extends along the front side of the module being in a connection position, and a groove provided in a rear face thereof into which the front side of the module is inserted, said groove having contacts provided therein which contact the conductive pad on both a top surface and a bottom surface of the module when the module is placed in an insertion/withdrawal position while allowing the pad to shift in a direction of insertion/withdrawal when the module is in the insertion/withdrawal position in which the rear side of the module is at a higher level than in the connection position, and a

pair of supporting parts that extend from the receiving part to support a left side, a right side and a bottom of the module in the connection position;

a metallic cover that is adaptable to engage with the connector body to sandwich the module between said metallic cover and the supporting parts to thereby maintain the module in the connection position, said metallic cover including a window for exposing the semiconductor chip when the module is placed in the connection position, and a heat sink secured to said metallic cover and contacts the semiconductor chip to dissipate heat therefrom, at least one of said metallic cover and said heat sink covering said contacts and the conductive pad to exhibit a shielding function against electromagnetic waves,

wherein said supporting parts each include a stepped part formed on an inner side thereof for supporting side and bottom faces of the module, and a slotted portion formed on an outer side thereof for receiving said metallic cover.